DOCUMENT RESUME

ED 272 871 CS 209 875

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TITLE Quantitative Graphics in Newspapers.
PUB DATE Aug 86
NOTE 42p.; Paper presented at the Annual Meeting of the Association for Education in Journalism and Mass Communication (69th, Norman, OK, August 3-6, 1986).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Charts; Commercial Art; Design; Diagrams; *Graphic Arts; *Graphs; *Illustrations; Media Research; *Newspapers; Statistical Analysis; *Statistical Data; Tables (Data); Technical Illustration
IDENTIFIERS Graphic Communication; Graphic Representation

ABSTRACT

The use of quantitative graphics in newspapers requires achieving a balance between being accurate and getting the attention of the reader. The statistical representations in newspapers are drawn by graphic designers whose key technique is fusion--the striking combination of two visual images. This technique often results in visual puns, personifications, and other visual figures of speech. However, when the aim of statistical information is communication, these fusions may be inaccurate and confusing. A study of samples from newspapers revealed 10 common pitfalls in using graphs to display quantitative information: (1) the tilted graph--the perspective is altered so that comparison is difficult; (2) the stacked graph--elements to be compared are stacked on top of one another; (3) the pseudo graph--illustrations in the form of graphs that are not graphs at all; (4) the graph with little or no variation--comparisons have no real meaning in these graphs; (5) the convention-violating graph--the logical rules of graph reading are ignored and confusing images are produced; for example, the growing federal deficit depicted by a deepening hole; (6) the bar graph with obscure bar ends--pictures used for bars have imprecise bar ends; (7) the buried line graph--the line that makes the meaningful part of the graph is hidden in a picture; (8) the three-dimensional graph--added perspectives add no information; (9) the overly complex graph--by presenting everything, they emphasize nothing; and (10) the multiple pie chart--comparing slices of two different pies is difficult. (Examples from newspapers illustrating the ten pitfalls are appended.) (SRT)

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Quantitative Graphics in Newspapers

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A paper presented to the Visual Communication Division at the annual convention of the Association for Education in Journalism and Mass Communication at Norman, Oklahoma, August 3-6, 1986.

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Quantitative Graphics in Newspapers

ABSTRACT

It appears that newspapers have begun publishing more graphs to display quantitative information in recent years. USA Today has been a leader in this development. Many of these graphs are in the form of a combination of a chart and a cartoon. These newspaper illustrations take the old standard graph forms of the bar chart, the line chart and the pie chart and present them in new variations. This kind of graphic device can be effective in attracting reader attention and in making statistical information more palatable, but it also runs the risk of distorting statistical information. This paper identifies 10 pitfalls to avoid in creating quantitative graphs in newspapers. The 10 pitfalls are types of graphs that are misleading, unclear, inaccurate or unnecessary.

Quantitative Graphics in Newspapers

How can graphs and charts be used in newspapers to display quantitative information in the most effective way? As newspapers tend toward the use of more statistical graphs, this is a question of interest to reporters, editors and staff artists. This paper attempts to improve quantitative graphs in newspapers by identifying ten common problems in graphs that should be avoided -- much as newswriting textbooks have attempted to improve lead writing by identifying types of leads to avoid.

Newspapers seem to be using graphs to display quantitative information more in the past three or four years than they did in previous years. As White has noted, "Charts have catapulted from the stock market pages into every section of today's newspapers."[1] Partly this may be due to the influence of USA Today, which has made statistical graphics a regular part of its news package. At least four graphs appear in USA Today every day in the "USA Snapshots" at the bottom of the front page of each section. Other graphs often appear at other locations in the newspaper. All of these graphs in USA Today tend to be in color and cartoon-like. The cartoon approach is obviously used to attract attention to the graphs by making them more dramatic and entertaining. These new figures, combining elements of the graph and the cartoon, are so distinctive that they almost deserve a new name -- perhaps "graphoon," "figuroon" or "chartoon."

Actually, the use of graphs that combine data and pictorial elements is not a recent development, however. Modley and Lowenstein refer to such graphs as "pictographs," and say the first ones were probably published in Willard Brinton's Graphic Methods in 1914.[2]

Modley and Lowenstein reproduce one of Brinton's figures that uses a small man for 1899 and a large man for 1911 to show the increase in passengers carried by the railroads from 14,591,000 to 32,837,000. Arkin and Colton's Graphs: How to Make and Use Them reproduces a number of "pictorial bar charts" from the 1930s, including one from the American Newspaper Publishers Association that represents the percentage of families that read newspapers in 14 cities with 14 stacks of newspapers of varying height.[3]

Some excellent books have appeared recently on the general topic of using graphs effectively. These include Tufte's The Visual Display of Quantitative Information[4] and Bertin's Semiology of Graphics.[5] Articles on the same topic have included Wainer's "How to Display Data Badly."[6]

These experts recommend some rather stringent procedures that would eliminate or at least drastically alter about 90 percent of the graphs now appearing in newspapers. Tufte, for instance, criticizes adornment in graphs, which he calls "chartjunk."[7] He states, "A large share of the ink on a graphic should present data-information, the ink changing as the data change."[8] He says further, "It is wrong to distort the data measures -- the ink locating values of numbers -- in order to make an editorial comment or fit a decorative scheme."[9]

The presentation of statistical graphs in newspapers involves a common problem in journalism, and that is the necessity of attracting and holding the reader's attention. As Turnbull and Baird put it, "How to win the competition for a reader's time is a vital problem found by all men and women in publishing."[10] Because of this special problem, it might not be appropriate to apply to newspapers

the same standards for graphs that have been developed for more scholarly presentations. The "chartoons" in USA Today may sometimes look silly. But they are attempting to do the same thing that good newspaper writers often do when they are presenting numbers -- lighten them up with something more interesting. In commenting on this problem in written material, award-winning feature writer William Blundell has said, "generally I will try not to let two paragraphs with numbers bump against each other -- ever. Because I think numbers are absolutely deadly."[11]

Tufte's recommendations may be too severe for newspaper graphics. The use of quantitative graphics in newspapers requires striking the proper balance -- a balance between being accurate and clear, and being attention-getting and entertaining.

Another consideration is that the people drawing statistical graphs for newspapers often have their training in graphic design rather than statistics. Training in graphic design may run counter to the recommendations of Tufte and others in several ways. For instance, one of the key techniques of graphic design is achieving "fusion" -- the bringing together of two visual images in a striking combination.[12] This can lead to visual puns, personifications and other visual figures of speech. It is obvious that this technique is frequently used by USA Today artists. From the point of view of communication of statistical information, however, these "fusions" may introduce clutter and confusion.

Three Basic Charts

Three of the most common graphical forms for displaying quantitative information are the bar chart, the line chart and the pie chart.

The bar chart represents varying quantities by bars of various lengths (see Figure 1). The bars can run vertically or horizontally. If horizontal, it is conventional for them to start at the left and run to the right.

The bars have traditionally been rectangles filled in with shading or color. A recent trend in newspaper graphics has been to use many different types of pictorial elements to make up the actual bars. These might include heights of people, heights of stacks of money, length of movie tickets, length of neckties, or height of candles. These different pictorial elements often represent a kind of visual punning, with the height or length of the bar having meaning but the make-up of the actual bar carrying additional meaning.

The line chart represents varying quantities by the up and down movement of a line on a graph defined by two axes -- a horizontal axis and a vertical axis (see Figure 2). Often, but not always, the horizontal axis represents time.

Line graphs are also sometimes used in newspapers in a form of visual punning, in which the line representing change in a quantity also becomes part of a picture.

The pie chart represents different quantities or shares as parts of a circle of varying sizes (see Figure 3). As the name suggests, it is based on the metaphor of dividing up a pie into shares of varying sizes. Some of the experts on graphics recommend against

using the pie chart at all.[13] It is more difficult to compare the different quantities than with some other types of graphs, and facilitating comparisons is usually one of the basic purposes of drawing graphs in the first place. For instance, in a standard bar chart with vertical bars, it is a fairly easy matter to look across the tops of the bars and see which one is taller. In a pie chart, this same kind of comparison is not as easy. Comparing two pie wedges does not involve just a straight movement of the eye. One has to compare either the area of the pie slices, or the circumference of the circle taken up by each slice.

The Study

This paper attempts to come up with a list of common pitfalls in newspaper graphics, much as some reporting texts have tried to identify problems to avoid in the area of lead writing.[14] In the area of graphics used to present statistical information, the paper attempts to find the equivalents of "the say-nothing lead," "the inaccurate tone lead," etc. For the purpose of writing this paper, I collected newspaper graphics over a period of six months or so. The approach was not that of a rigorous content analysis, with an elaborate sampling scheme. Rather, the study is more like a biological field study, in which the researcher collects specimens and attempts to classify them. Looking over these graphs and charts, I attempted to come up with a list of common problems in using graphs to display quantitative information in newspapers. The following list is of ten types of graphs to avoid.

1. The Tilted Graph

One of the purposes of a graph is usually to facilitate comparisons. In some graphs, such as the pie chart, this is often difficult enough at best. It becomes even more difficult when the chart is on a surface that is no longer flat to the viewer but is at an angle. This is sometimes done in newspaper graphics, usually so the chart can be incorporated in a cartoon-like drawing of something else. Figure 4 shows an example of a pie chart that is in the form of a coin being dissected while lying on a table. The usual problem of comparing the wedges or slices in a pie chart is heightened by the problem of perspective -- the front edge of the coin is closer than the back edge.

A similar problem of tilt occurs in the line graph on the end of a six-pack of beer in Figure 5. The problem of interpreting the line is made more difficult by the foreshortening occurring in the graph because of its tilt.

2. The Stacked Graph

Some newspaper graphs suffer from the problem that they obscure comparisons instead of facilitating them. Comparisons are facilitated when two lengths begin at the same point and the eye only has to look to the other end to see which is longer. This is what an effective bar graph does.

One type of graph that obscures comparisons is the stacked graph. In this kind of graph, one element that you might want to compare is stacked on top of another element that you might want to compare. The result is that the two elements do not start from the

same base, and comparisons are difficult at best.

The comparison of nuclear warheads for the U.S. and the U.S.S.R. in Figure 6 is a stacked graph. It attempts to show a number of comparisons, but does not do so clearly. The top section of each missile, for example, represents the number of ICBMs, but the two sections are not really lined up with one another.

A similar problem occurs in Figure 7, which shows world crude oil production over a number of years for a number of different regions. The problem is that the results for each region takes as its base the line showing the results for the region under it. For instance, did the Soviet bloc and China produce more oil in 1979 than the Middle East? It is hard to tell because the two do not start on the same baseline.

Wainer argues that the only reason for such stacking is to give a graphical representation of the total, and recommends that the same effect can be achieved by plotting each line from the same base and adding a separate line for the total.[15]

3. The Pseudo Graph

Some illustrations in newspapers look like graphs but are not really graphs at all.

For instance, Figure 8, which presents data on public attitudes toward sex education, looks somewhat like a bar chart, but is essentially a table superimposed over a drawing. The illustration perhaps succeeds in drawing attention to the data, but it is not really a graph or chart.

Another example of a pseudo graph is the demographic data

printed on a portion of the American flag in Figure 9. The reader has become conditioned to expect that bars on the flag in illustrations of this type vary in length in some kind of meaningful way -- it comes as something of a shock to realize that in this picture they do not.

4. The Graph with Little or No Variation

Sometimes a graph is used to show data that essentially have no variation. In this case, a device that facilitates comparisons has no real meaning. For example, the bars representing the longest NFL losing streaks from the start of the season in Figure 10 are not really conveying much information. The important point is the similarity of the data -- these are the long losing streaks -- not the differences between the data.

A similar example is reproduced in Figure 11, which shows the basketball players with the most NBA seasons under their belts.

The graph with little or no variation is often essentially a pseudo graph -- it really isn't presenting data that couldn't just as well be presented in text. Tufte comments that "small, noncomparative, highly labeled data sets usually belong in tables."[16]

Both of these examples come from USA Today's sports page "USA Snapshots," a daily feature requiring statistical graphs and which the newspaper probably has difficulty filling in a meaningful way.

5. The Convention-Violating Graph

There are certain conventions that readers of graphs may be accustomed to, and violating these conventions can only produce

confusion in the reader.

The graph in Figure 12, for example, illustrates the federal deficit over a period of years. The graph may seem a bit bewildering. Part of the reason for the bewilderment is that the graph represents a growing deficit as a deepening hole, and readers are used to seeing a growing quantity rising on a graph.

The graph in Figure 13 illustrates positive and negative changes in quality of life in Austin, Texas, from 1970 to 1990 (the latter figures apparently are projections). The cactuses in the top half of the graph are bars showing different values by their vertical height. What is going on in the right half of the figure is less clear. At first glance, it may seem that the piles of dirt with armadillos on top of them are the meaningful units -- it takes a while to realize that the depth of the holes is the meaningful value. The real problem with this figure is that interpreting the graph correctly requires a figure-ground shift. In the left part of the graph, the black is the figure and the white is the ground; in the right part of the graph the white is the figure and the black is the ground.

6. The Bar Graph with Obscure Bar Ends

Newspapers presenting bar graphs have used all kinds of things as the picture elements making up the bars. Recent examples have included heights of people, heights of stacks of money, heights of candles, lengths of hockey puck shots, lengths of movie tickets, lengths of neckties, and lengths of squirts of water from a squirting flower worn on a man's lapel. One of the problems in using these kinds of elements is that the end of the bar becomes imprecise. As

Tufte notes, "The confounding of design variation with data variation over the surface of the graphic leads to ambiguity and deception, for the eye may mix up changes in the design with changes in the data."[17]

Figure 14, which contains bars made up of a gasoline pump hose, an arm holding a paint roller, an arm holding a plate of cookies, an arm waxing a car, an arm holding a can of food and a hand holding an article of clothing, is an obvious example.

The hamburger in Figure 15 is another example, with each slice making up a different bar in the bar graph. Notice in particular the imprecise placement of "fats/oils." This graph also violates the convention that horizontal bar graphs should have the bars beginning on the left and extending to the right.

Even White, who tends to favor some rather radical techniques if they succeed in getting attention, cautions, "To avoid confusion, it is better to present the bars as clean, smooth shapes."[18]

7. The Buried Line Graph

Sometimes the newspaper graphic artist attempts to work the quantitative graph into a representational picture. This can lead to problems, however, when it ends up burying or hiding the line or other element that makes up the graph.

For instance, the picture of Santa in Figure 16 contains two line graphs, but they may not be immediately apparent. One is in the outline of his cap and the other is at the top of his beard.

Figure 17, which shows a slab of beef stacked on a turkey, which in turn is stacked on a fish, is another example. The

significant data indicators in this graph are the line representing the top outline of the beef slab, the line where the beef and the turkey come together and the line where the turkey and the fish come together.

8. The Unnecessarily Three-Dimensional Graph

Many graphic artists seem to operate under a compulsion to render everything as three-dimensional objects. As Thompson and Davenport note, "There is a popular belief that three-dimensional things are somehow better than graphic ones."[19] This tendency shows up frequently in newspaper graphics which convert bar charts, line charts and pie charts into three-dimensional objects.

Representing a line graph as a three-dimensional structure adds to its complexity, but doesn't usually add much to the clarity. In essence, it just adds another set of lines to decipher. The three graphs dealing with teenage drug use in Figure 18 illustrate the problem. The point of interest, the line at the top, is only made less sharp by its three-dimensional extension.

The comparison of prison capacity and prison population over time in Figure 19 has a similar problem. The three-dimensional presentation only doubles the number of lines that the reader has to try to figure out.

As Wainer notes, "increasing the number of dimensions (can) make a graph more confusing."[20] Tufte comments, "The addition of a fake perspective to the data structure clutters many graphics."[21]

9. The Overly-Complex Graph

Some graphs in newspapers fail to communicate by being too complex. The presentation of data on executive women in Figure 20 has this problem. The figure contains all the common types of graphs -- line charts, pie charts, and bar charts -- and a table, as well. By its own count, it contains six different data presentations.

One problem with these kinds of figures is that by presenting everything, they don't emphasize anything. In newswriting terms, they bury the lead.

Another example is presented in Figure 21, which reports on highway revenue and expenditures in Texas. This graph buries the news story -- that the biggest share of highway revenue comes from federal grants. And this is an important story because it gives meaning to the threats to cut off federal highway aid to Texas if more enforcement is not given to the 55 m.p.h. speed limit. It shows that the loss of federal highway funds would be a serious loss.

10. The Multiple Pie Chart

Sometimes more than one pie chart appears in the same graph. This can create problems when it is desirable to compare slices of the two pies, which it often is. An example occurs in Figure 22, which shows the types of airplane flights resulting in fatalities in 1985 in one pie chart, and the number of hours flown in various types of airplane flights in 1985 in another pie chart. It is difficult to compare results in the two graphs for the same type of airplane flight -- for instance, commuters. The graph also hides the real story -- which type of airplane flight has the most fatalities in relation to the number of hours flown.

A similar difficulty of comparison occurs in the graph showing the share of federal investment in research and development going to defense in various years (Figure 23). First of all, it is difficult to pick the wheels that are pie charts out from the wheels that contain only the year labels. Second, the pie charts that the reader is attempting to compare sections from are not even lined up on the same horizontal base line. Tufte's criticism seems appropriate: "the only worse design than a pie chart is several of them."[22]

Summary and Conclusions

It appears that newspapers have begun publishing more graphs to display quantitative information in recent years. Many of these graphs are in the form of a combination of a chart and a cartoon -- a form I have labeled the "chartoon." This kind of graphic device can be effective in attracting reader attention and in making statistical information more palatable, but it also runs the risk of distorting the statistical information. This paper has identified 10 pitfalls to avoid in creating "chartoons." The 10 pitfalls are types of graphs that are misleading, unclear, inaccurate or unnecessary.

This list of pitfalls can be used as a checklist in teaching students about effective display of quantitative information in newspapers. Furthermore, it appears that quantitative graphics may be a neglected area in many journalism programs and textbooks. Authors might want to consider adding sections on this topic to journalism textbooks, and teachers might want to work it into course outlines. The topic would be appropriate for courses in news editing, newspaper layout and design, and graphics.

Several additional studies in this area would be worthwhile. One useful study would examine changes in newspaper graphics over time. Have they indeed increased in recent years? Is the use of "chartoons" becoming more widespread since the advent of USA Today? Another study or series of studies should investigate attention to and comprehension of quantitative graphics in newspapers. How much time does the reader spend looking at the average "chartoon"? How much does the reader comprehend from the average "chartoon"? What elements of the "chartoon" does the reader spend the most time looking at? The Mackworth head camera, which can be used to record over time the points a person's eyes are focusing on, could be a useful tool in this research.[23]

Footnotes

1 Jan V. White, Using Charts and Graphs: 1000 Ideas for Visual Persuasion (New York: R.R. Bowker, 1984), p. 1.

2 Rudolf Modley and Dyno Lowenstein, Pictographs and Graphs: How to Make and Use Them (New York: Harper and Brothers, 1952), p. 4.

3 Herbert Arkin and Raymond R. Colton, Graphs: How to Make and Use Them (New York: Harper and Brothers, 1940), p. 122.

4 Edward R. Tufte, The Visual Display of Quantitative Information (Cheshire, Conn.: Graphics Press, 1983).

5 Jacques Bertin, Semiology of Graphics (Madison: University of Wisconsin Press, 1983).

6 Howard Wainer, "How to Display Data Badly," American Statistician, 38:137-147 (May 1984).

7 Tufte, op. cit., p. 107.

8 Ibid, p. 93.

9 Ibid, p. 59.

10 Arthur T. Turnbull and Russell N. Baird, The Graphics of Communication (New York: Holt, Rinehart and Winston, 1964), p. 1.

11 Roy Peter Clark, ed., Best Newspaper Writing 1982 (St. Petersburg, Fla.: Modern Media Institute, 1982), p. 36.

12 Philip Thompson and Peter Davenport, The Dictionary of Graphic Images (New York: St. Martin's Press, 1980), p. vii.

13 Tufte, op. cit., p. 178.

14 William Metz, Newswriting: From Lead to "30" (Englewood Cliffs, N.J.: Prentice-Hall, 1977), pp. 57-66; Ken Metzler, Newsgathering (Englewood Cliffs, N.J.: Prentice-Hall, 1979), pp. 87-91; Warren K. Agee, Phillip H. Ault and Edwin Emery, Reporting and

Writing the News (New York: Harper and Row, 1983), pp. 91-95.

15 Wainer, op. cit., p. 143.

16 Tufte, op. cit., p. 33.

17 Tufte, op. cit., p. 61.

18 White, op. cit., p. 23.

19 Thompson and Davenport, op. cit., p. 232.

20 Wainer, op. cit., pp. 144-145.

21 Tufte, op. cit., p. 118.

22 Tufte, op. cit., p. 178.

23 N.H. Mackworth and A.J. Morandi, "The Gaze Selects Informative Details Within Pictures," Perception and Psychophysics 2:547-552 (1967).

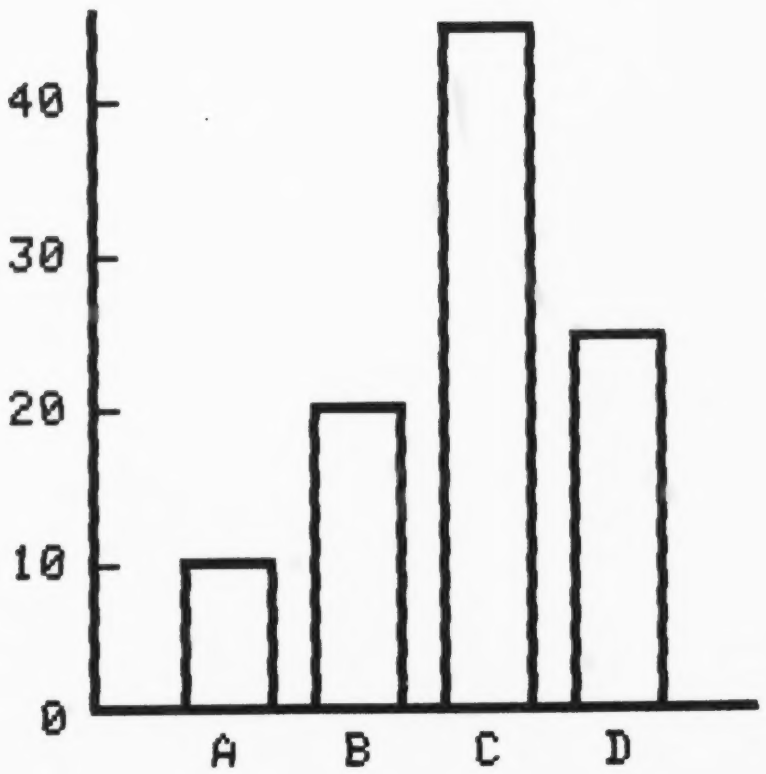

FIGURE 1. The bar chart.

FIGURE 2. The line chart.

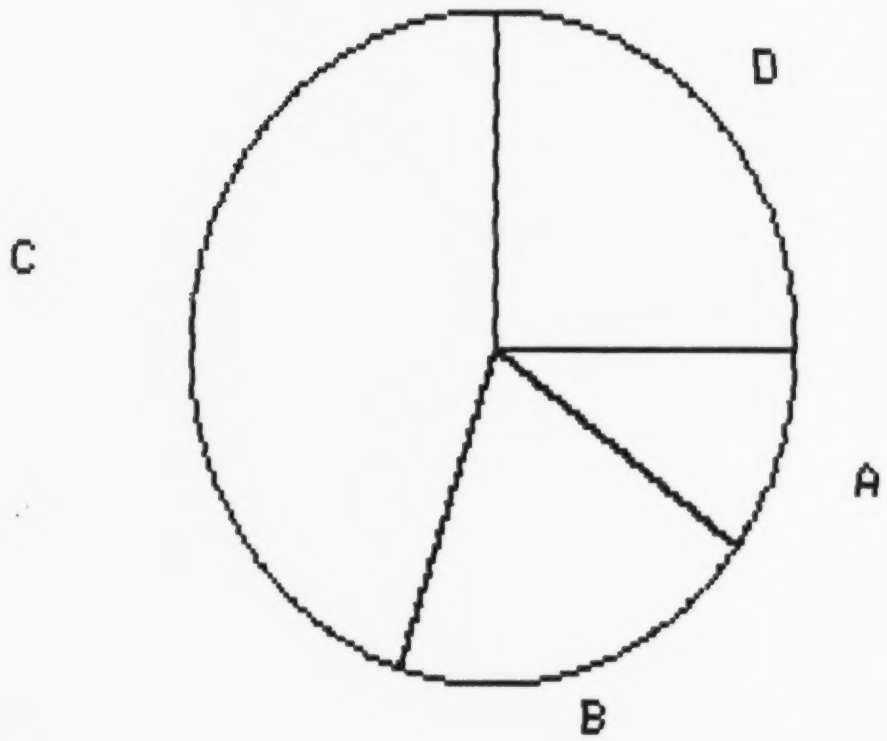

FIGURE 3. The pie chart.

FIGURE 4. An example of the tilted graph.

Source: USA Today, Nov. 15, 1985, p. 1A.

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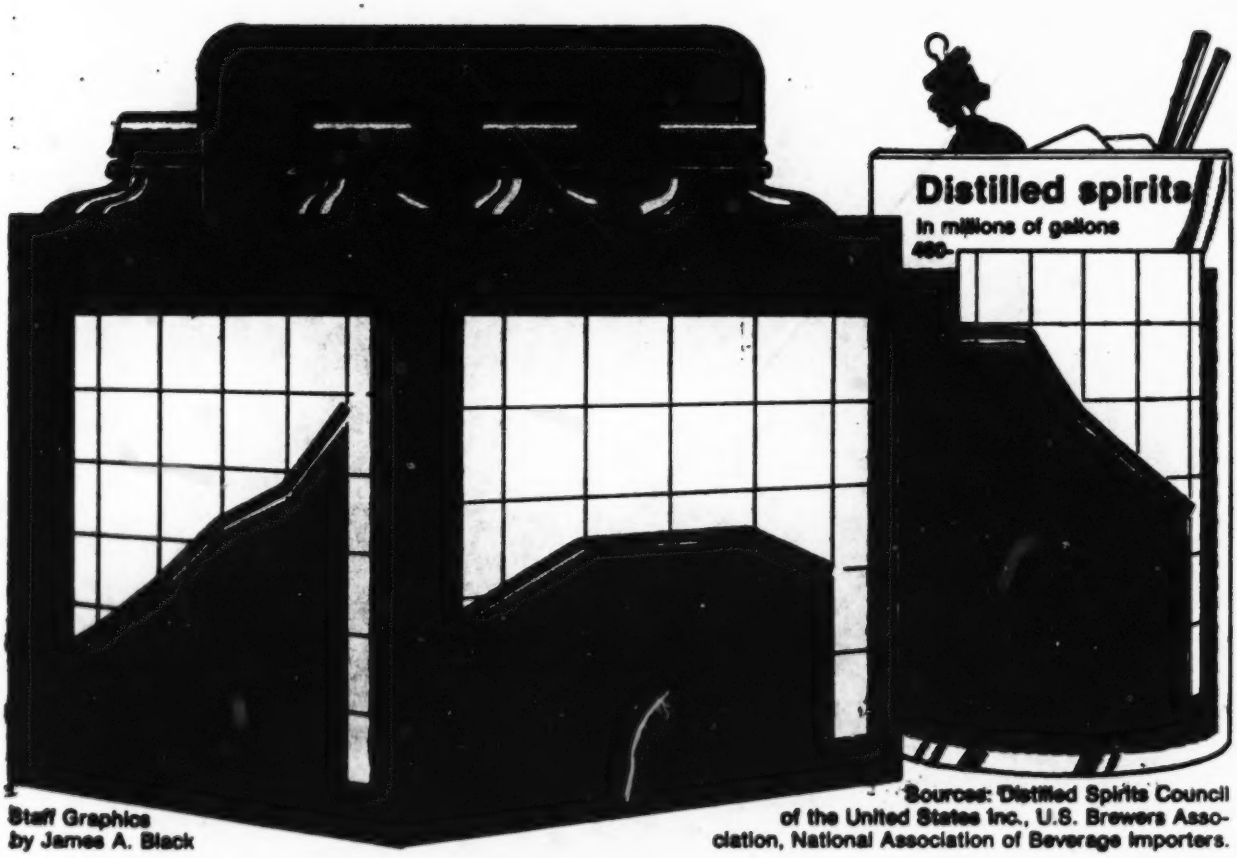
Distilled spirits
In millions of gallons
Staff Graphics
by James A. Black
Sources: Distilled Spirits Council
of the United States Inc., U.S. Brewers Asso-
ciation, National Association of Beverage Importers.

FIGURE 5. An example of the tilted graph.

Source: Austin American-Statesman, July 6, 1985, p. C1.

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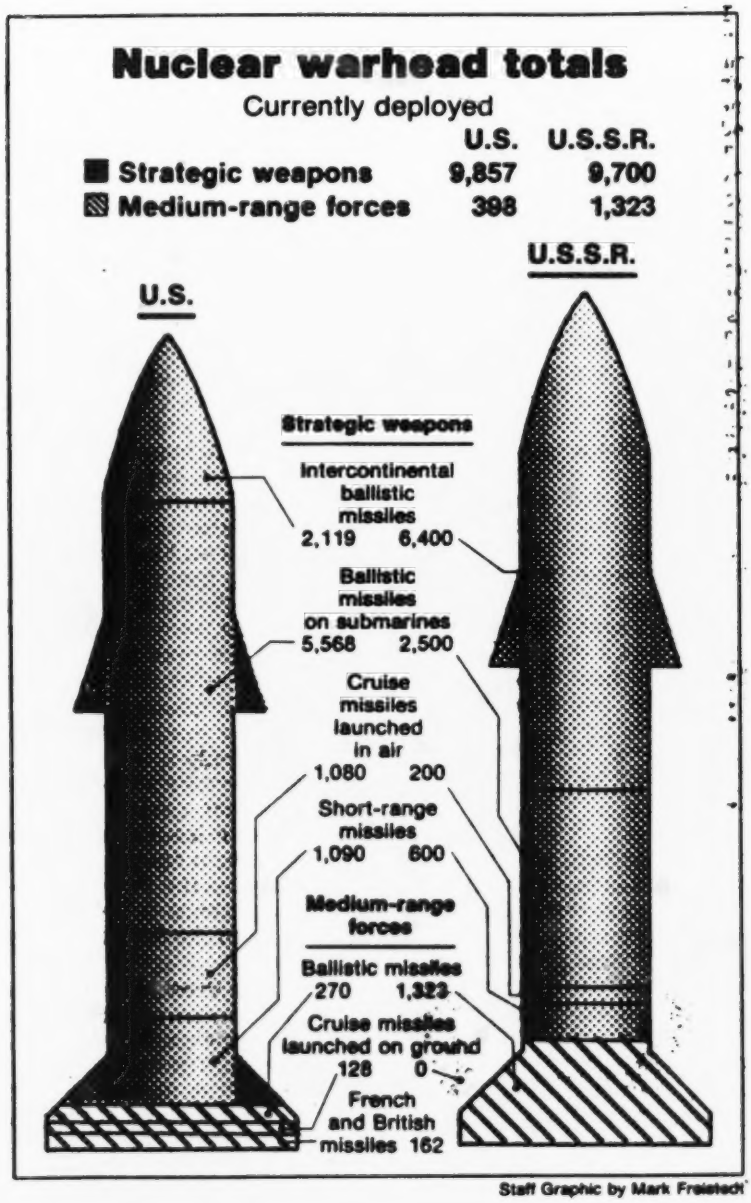

FIGURE 6. An example of the stacked graph.

Source: Austin American-Statesman, Nov. 17, 1985, p. K1.

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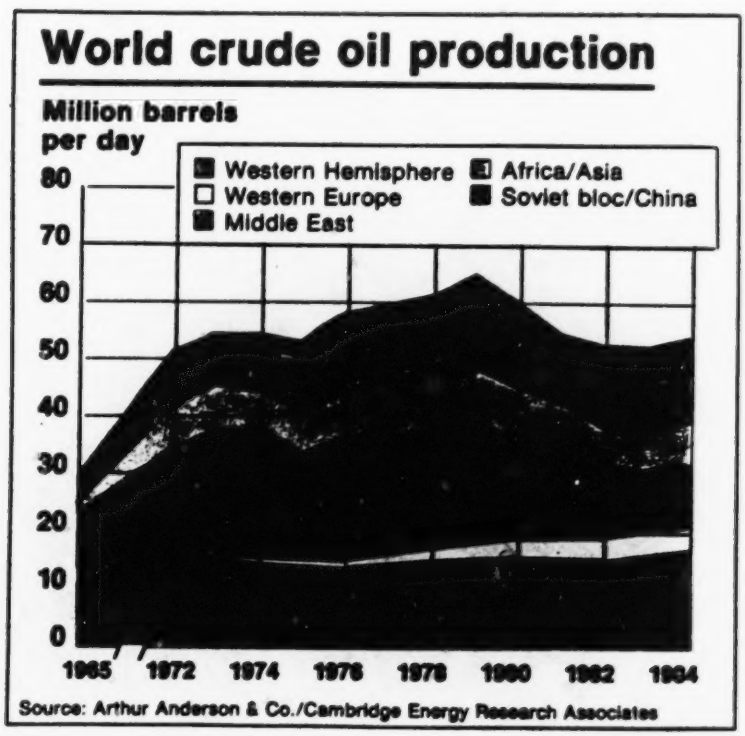

FIGURE 7. An example of the stacked graph.

Source: Austin American-Statesman, Dec. 10, 1985, p. D1.

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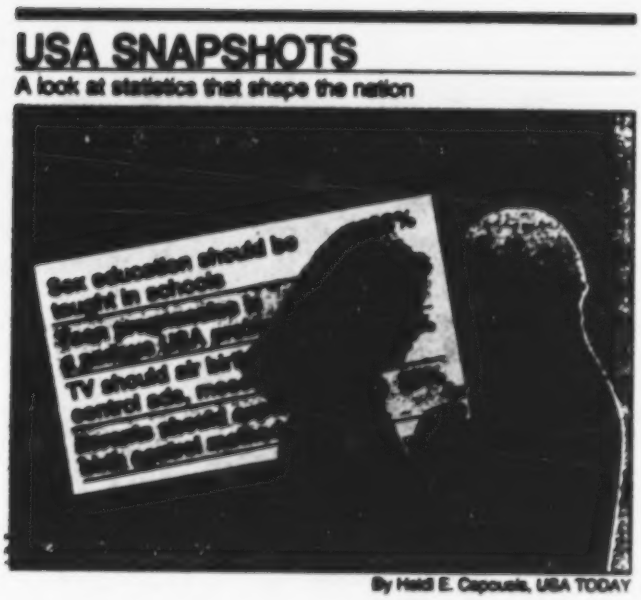

FIGURE 8. An example of the pseudo graph.

Source: USA Today, Nov. 6, 1985, p. A1.

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FIGURE 9. An example of the pseudo graph.

Source: Austin American-Statesman, Feb. 5, 1985, p. 3.

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FIGURE 10. An example of the graph with little or no variation.

Source: USA Today, Nov. 6, 1985, p. C1.

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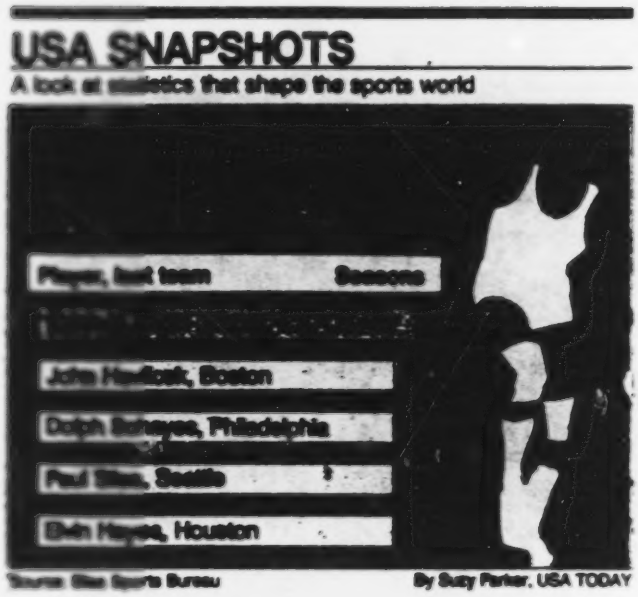

FIGURE 11. An example of the graph with little or no variation.

Source: USA Today, Oct. 31, 1985, p. C1.

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FIGURE 12. An example of the convention-violating graph.

Source: USA Today, Dec. 11, 1985, p. B1.

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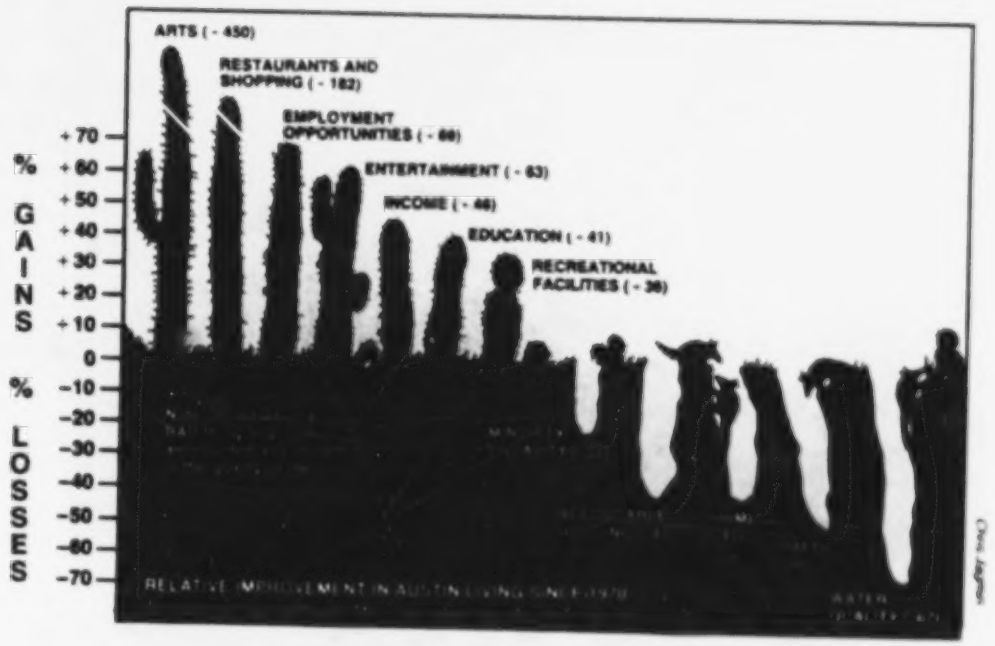

FIGURE 13. An example of the convention-violating graph.

Source: Third Coast, July, 1984, p. 43.

Chris Jagman/3rd Coast Magazine. Reprinted with permission.

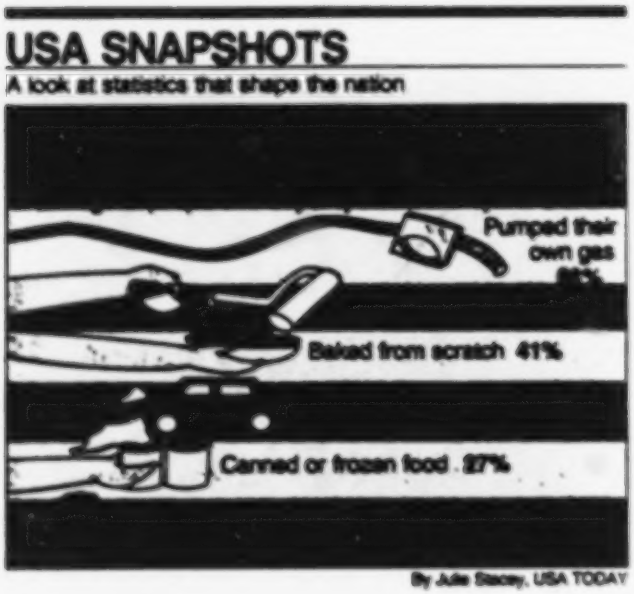
USA SNAPSHOTS
A look at statistics that shape the nation
Pumped their own gas
Baked from scratch 41%
Canned or frozen food 27%
By Julie Stacey, USA TODAY

FIGURE 14. An example of the bar graph with obscure bar ends.

Source: USA Today, Dec. 19, 1985, p. A1.

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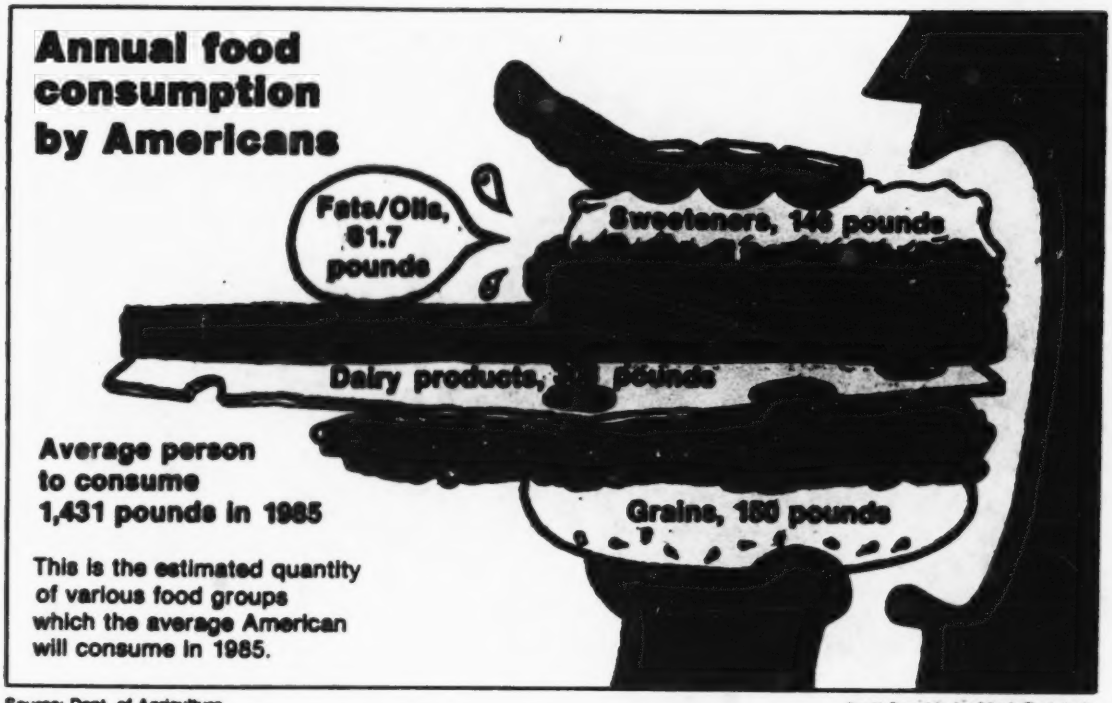
Annual food consumption by Americans
Fats/Oils, 81.7 pounds
Sweeteners, 146 pounds
Dairy products,
pounds
Grains, 150 pounds
Average person to consume 1,431 pounds in 1985
This is the estimated quantity of various food groups which the average American will consume in 1985.
Source: Dept. of Agriculture
Staff Graphic by Mark Priestadt

FIGURE 15. An example of the bar graph with obscure bar ends. Source: Austin American-Statesman, Dec. 21, 1985, p. E1. Reprinted with permission.

FIGURE 16. An example of the buried line graph.

Source: Austin American-Statesman, Dec. 16, 1985, p. D1.

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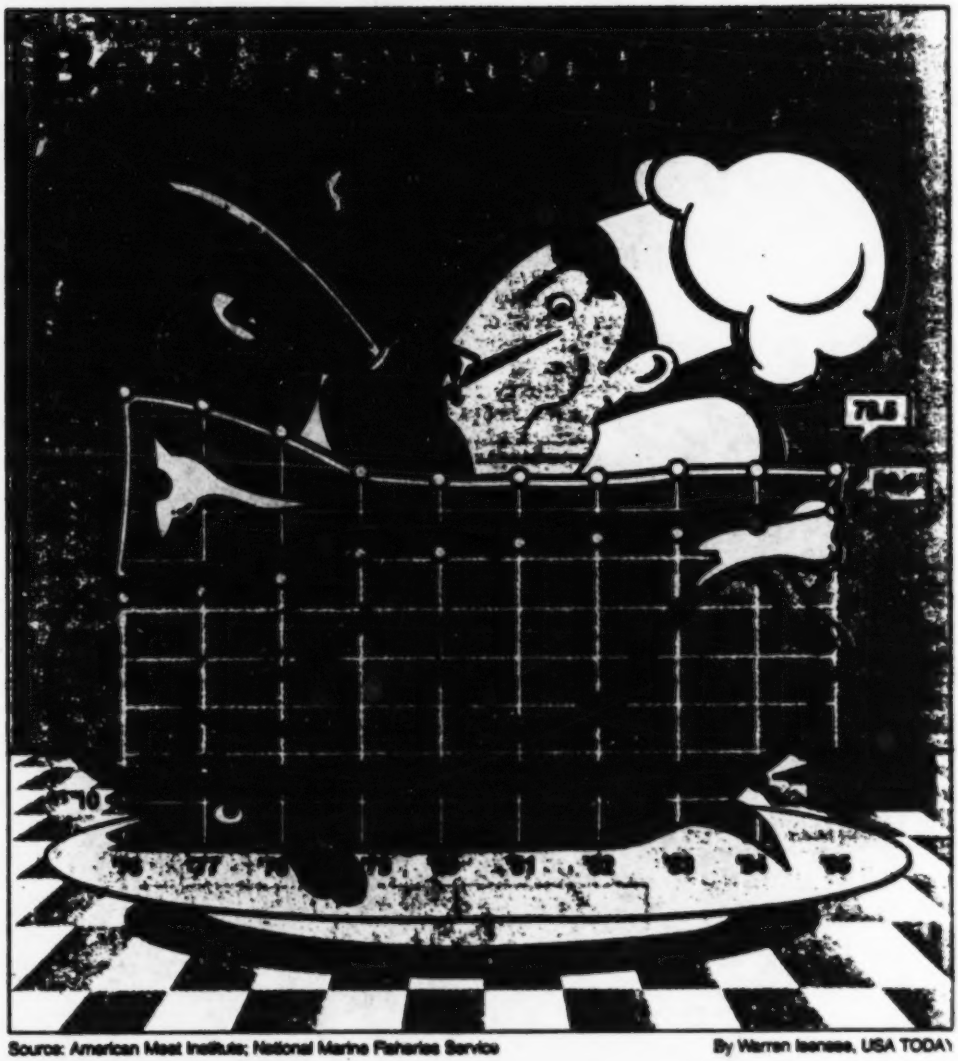

FIGURE 17. An example of the buried line graph.

Source: USA Today, Jan. 24, 1986, p. 1B.

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FIGURE 18. An example of the unnecessarily three-dimensional graph.

Source: USA Today, Jan. 8, 1985, p. A1.

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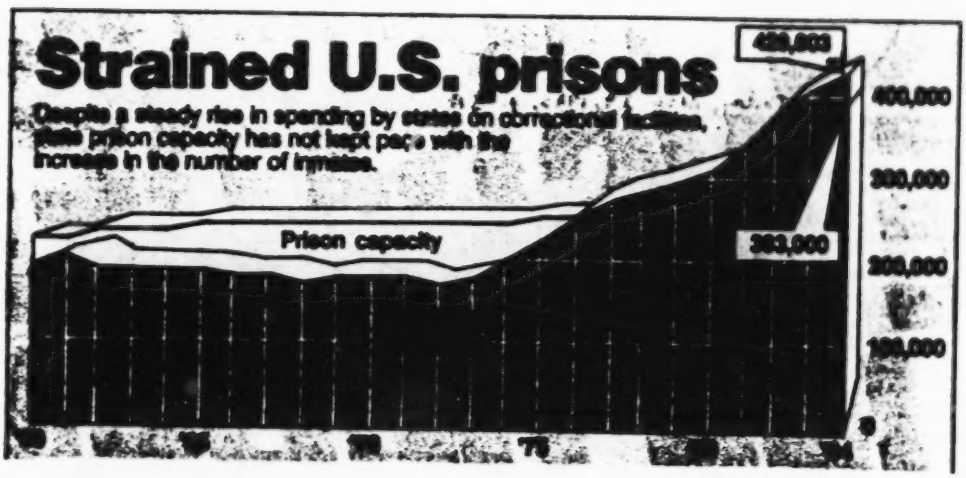
Strained U.S. prisons
Despite a steady rise in spending by states on correctional facilities, state prison capacity has not kept pace with the increase in the number of inmates.
Prison capacity
400,000
300,000
200,000

FIGURE 19. An example of the unnecessarily three-dimensional graph.

Source: USA Today, Nov. 29, 1985, p. A3.

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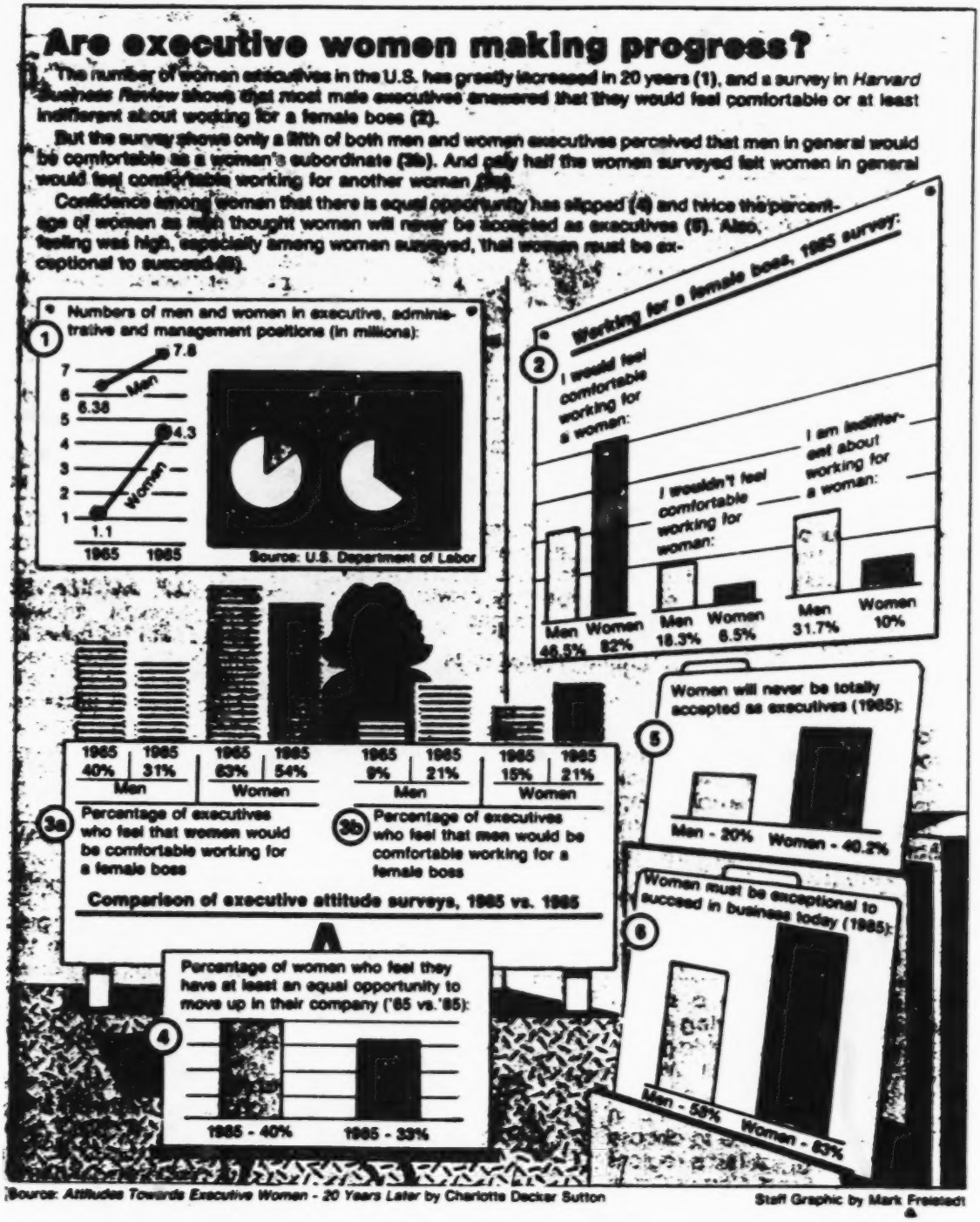
Are executive women making progress?
The number of women executives in the U.S. has greatly increased in 20 years (1), and a survey in Harvard Business Review shows that most male executives answered that they would feel comfortable or at least indifferent about working for a female boss (2).
But the survey shows only a fifth of both men and women executives perceived that men in general would be comfortable as a woman's subordinate (3b). And only half the women surveyed felt women in general would feel comfortable working for another woman (3a).
Confidence among women that there is equal opportunity has slipped (4) and twice the percentage of women as men thought women will never be accepted as executives (5). Also, feeling was high, especially among women surveyed, that women must be exceptional to succeed (6).
1
Numbers of men and women in executive, administrative and management positions (in millions):
7.8
6.38
4.3
1.1
Men
Women
1965
1985
Source: U.S. Department of Labor
2
Working for a female boss, 1985 survey:
I would feel comfortable working for a woman:
I wouldn't feel comfortable working for women:
I am indifferent about working for a woman:
Men 46.5%
Women 82%
Men 18.3%
Women 6.5%
Men 31.7%
Women 10%
3a
1965 40%
1985 31%
Men
1965 63%
1985 54%
Women
Percentage of executives who feel that women would be comfortable working for a female boss
3b
1965 9%
1985 21%
Men
1965 15%
1985 21%
Women
Percentage of executives who feel that men would be comfortable working for a female boss
Comparison of executive attitude surveys, 1965 vs. 1985
4
Percentage of women who feel they have at least an equal opportunity to move up in their company ('65 vs.'85):
1965 - 40%
1985 - 33%
5
Women will never be totally accepted as executives (1985):
Men - 20%
Women - 40.2%
6
Women must be exceptional to succeed in business today (1985):
Men - 58%
Women - 63%
Source: Attitudes Towards Executive Women - 20 Years Later by Charlotte Decker Sutton
Staff Graphic by Mark Freistedt

FIGURE 20. An example of the overly-complex graph.

Source: Austin American-Statesman, Oct. 28, 1985, p. C1.

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How it works: The Highway Department

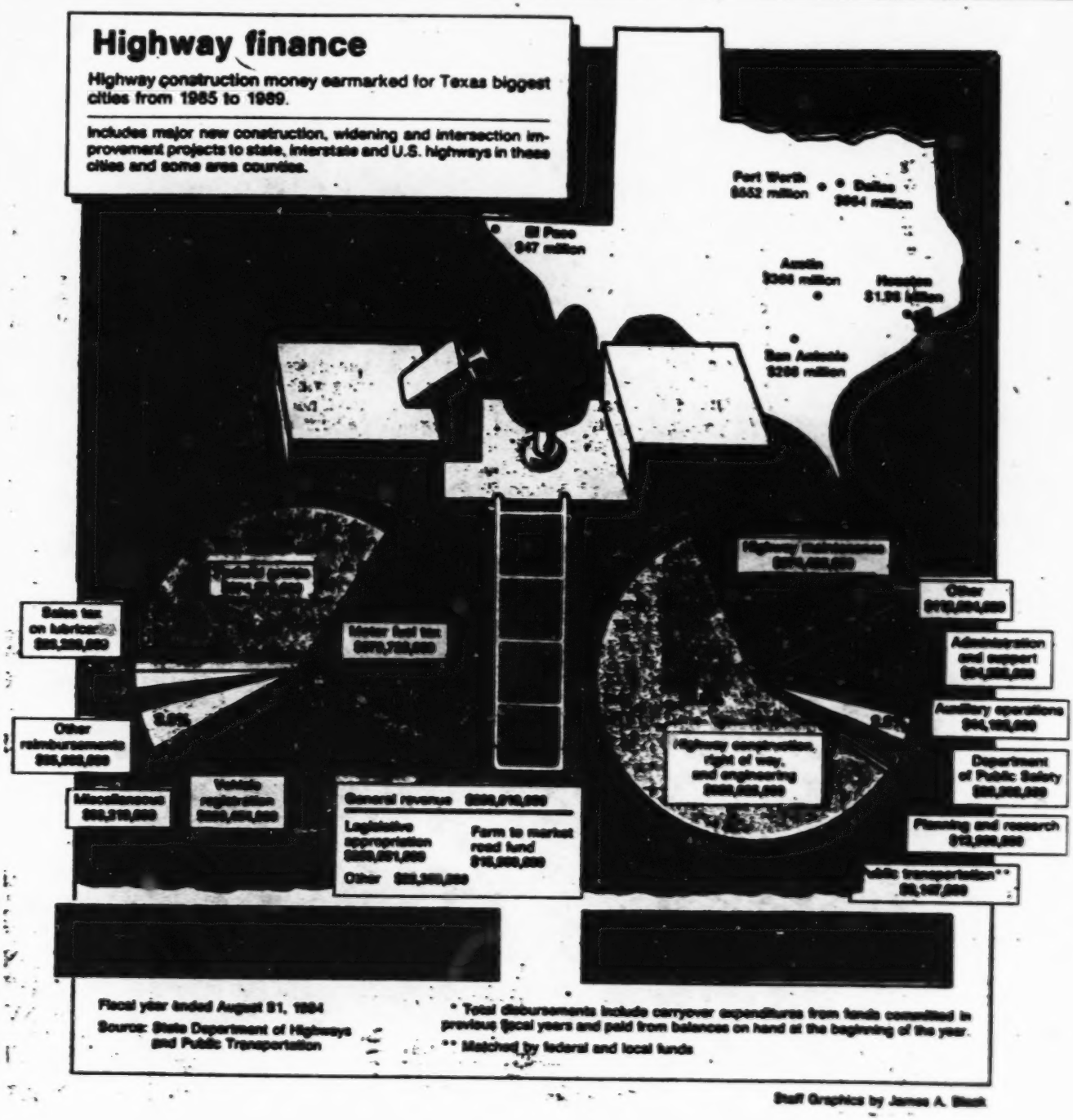
Highway finance
Highway construction money earmarked for Texas biggest cities from 1985 to 1989.
Includes major new construction, widening and intersection improvement projects to state, interstate and U.S. highways in these cities and some area counties.
Fort Worth
$652 million
Dallas
$664 million
El Paso
$47 million
Austin
$366 million
Houston
$1.86 billion
San Antonio
$298 million
Sales tax on lubricants
Motor fuel tax
Other reimbursements
Miscellaneous
Vehicle registration
General revenue
Legislative appropriation
Farm to market road fund
Other
Highway construction, right of way, and engineering
Other
Administration and support
Auxiliary operations
Department of Public Safety
Planning and research
Public transportation**
Fiscal year ended August 31, 1984
Source: State Department of Highways and Public Transportation
* Total disbursements include carryover expenditures from funds committed in previous fiscal years and paid from balances on hand at the beginning of the year.
** Matched by federal and local funds
Staff Graphics by James A. Blank

FIGURE 21. An example of the overly-complex graph.

Source: Austin American-Statesman, June 24, 1985, p. A4.

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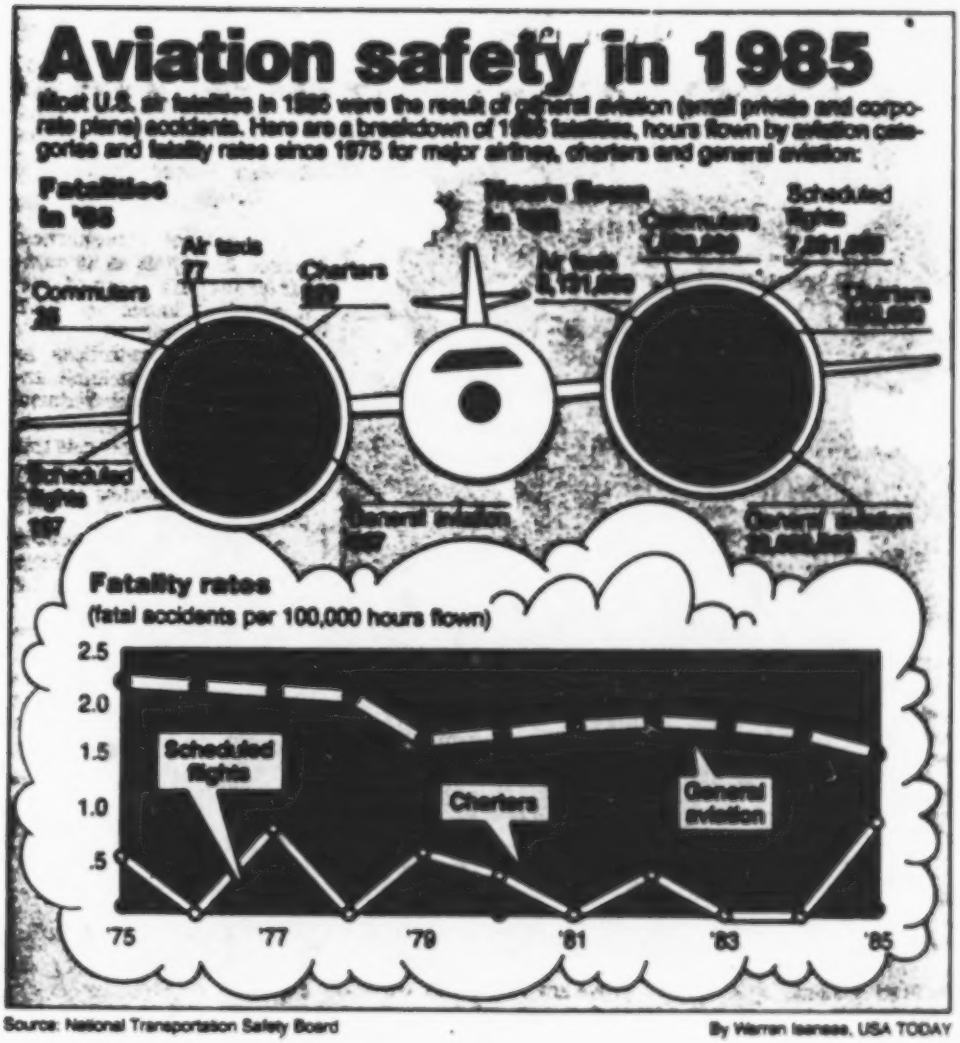

FIGURE 22. An example of the multiple pie chart.

Source: USA Today, Feb. 14, 1986, p. 3A.

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FIGURE 23. An example of the multiple pie chart.

Source: USA Today, Dec. 11, 1985, p. A1.

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